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Evaporation of forsterite controlled by H2O/H2 in the ambient gas

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Evaporation experiments on forsterite have been revealed its evaporation kinetics in vacuum (free-evaporation regime) and in the presence of low-pressure hydrogen gas (hydrogen reaction-dominated regime). Tsuchiyama et al. (1999, GCA) proposed another evaporation regime called H2O/H2 buffer-dominated regime (HBD), where evaporation is controlled by the H2O/H2 ratio in the ambient gas. The HBD evaporation regime is important to consider the dust evolution in protoplanetary disks, but no experimental study has been done to investigate the evaporation kinetics. We have performed evaporation experiments on forsterite at low pressures with controlled H2O/H2 ratios, and have found that evaporation rates are controlled by the H2O/H2 ratio as proposed by Tsuchiyama et al. (1999).

Keywords: forsterite, evaporation, water vapor, kinetics